

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Application of DANIEL et al.

Serial No. 10/586,203

Art Unit: 1796

Filed: July 18<sup>th</sup>, 2006

Examiner: Nguyen, Vu Anh

For: Method for Producing Polymers

**DECLARATION**

I, Marco Krueger, Dr. rer. nat., a citizen of the Federal Republic of Germany and residing at Falkensteinweg 37, 68219 Mannheim, Germany, declare as follows:

I am a fully trained chemist, having studied chemistry at the University of Hamburg, Germany, from October 1995 to February 2004.

I was awarded my doctor's degree by University of Hamburg in February 2004;

I joined BASF SE (formerly doing business as BASF Aktiengesellschaft) of 67056 Ludwigshafen, Germany, in 2004. Since joining BASF SE, I have been working in the fields of polymer process development and superabsorbent polymers. I therefore am familiar with the subject matter disclosed and claimed in the above-identified application.

I have read the Office Action dated 10<sup>th</sup> February 2009 and the Advisory Action dated 4<sup>th</sup> June 2009, and note that in the Examiner's opinion the subject matter of the claims is anticipated or rendered obvious by the disclosures of Shimomura et al. (US 5,210,298) and/or Cooke (GB 1 073 856). The basis of the Examiner's opinion is that the aqueous sodium acrylate/acrylic acid solutions disclosed by Shimomura et al. were inherently supersaturated.

I have retrieved the results of experiments performed by Mr. Dieter Ehnes, a former laboratory technician with BASF SE, now retired, who had (for other purposes and under my supervision) measured solubility data for partially and totally neutralized aqueous acrylic acid solutions in January 2008. This solubility data shows that the subject matter as claimed in the instant application is neither anticipated nor rendered obvious by the cited prior art.

Mr. Ehnes prepared samples of aqueous acrylic acid solutions with a certain degree of neutralization by neutralizing acrylic acid with sodium hydroxide solutions. To obtain the first series of data (solubility of sodium acrylate in water, i.e. totally neutralized acrylic acid), 184.05 g of a 35 wt.% aqueous sodium hydroxide was slowly mixed with 115.95g of acrylic acid supplied via a dropping funnel resulting in a totally neutralized acrylic acid solution (degree of neutralization (DN) = 100 mole%, i.e. a sodium acrylate solution) and a solids content of 50.46 wt.%. The temperature was maintained at 30°C by a water/ice bath. At this temperature, and also after warming to 50°C, the

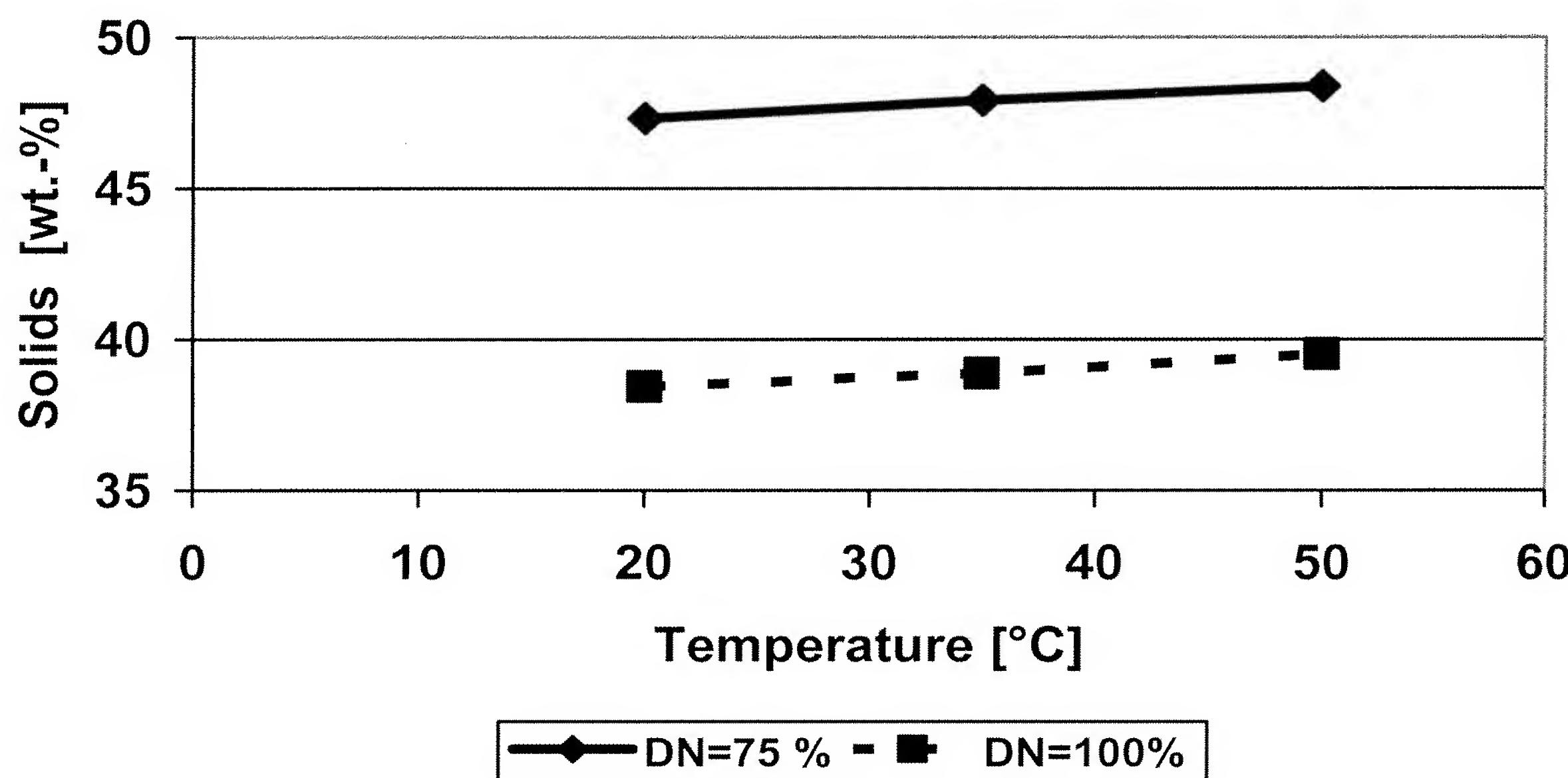
equilibrated solution was clearly a slurry with precipitated sodium acrylate crystals. The temperature was maintained at 50°C and deionized water was slowly added to decrease the solids content. Finally, after an addition of 83.9 g deionized water, the solution became clear. The solids content at this point was calculated as 39.52 wt.%, and was recorded as solubility at 50°C. Then, the temperature was lowered to 35°C and the acrylic acid salt precipitated again, forming a slurry. Again, deionized water was slowly added until the solution cleared to determine the solubility at 35°C. This step was repeated at 20°C.

This series of determinations was repeated with an acrylic acid solution having a neutralization degree of 75 %. In this second series, the initial solution was prepared from 163.04 g of 35 wt.% aqueous sodium hydroxide solution and 136.96 g acrylic acid.

The results of the experiments were:

Temperature [°C]	Solubility	
	[wt.-% solids at saturation point] DN = 75 %	DN = 100 %
20	47.31	38.44
35	47.91	38.88
50	48.37	39.52

A graphical representation of these results is:



These experiments show that the solubility of sodium acrylate/acrylic acid solution depends not only on the temperature, but even more on the degree of neutralization. A higher degree of neutralization lowers the solubility. A solution may thus become supersaturated upon cooling or upon

adding further sodium hydroxide. In other words, an aqueous acrylic acid solution having a certain degree of neutralization may be less than supersaturated while another aqueous acrylic acid solution having the same solids content (i.e. being equally concentrated), but a higher degree of neutralization, may be supersaturated.

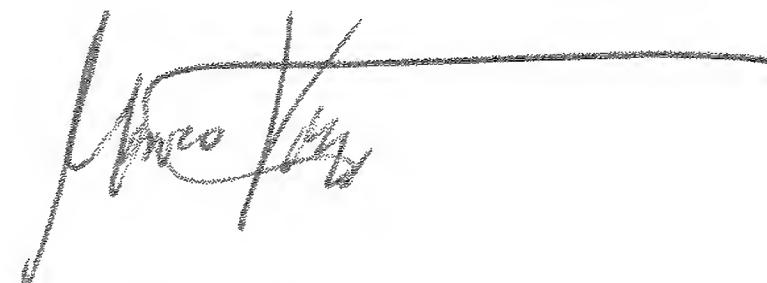
I do not have data for overneutralized solutions ( $DN > 100\%$ , i.e. solutions of sodium acrylate containing excess sodium hydroxide) ready at hand.

## CONCLUSION

The data described hereinabove demonstrate that supersaturation of aqueous sodium acrylate/acrylic acid solutions also depends on temperature and degree of neutralisation, and not only on solids content or concentration of the solution. Consequently, the solutions disclosed by Shimomura et al. were not necessarily or inherently supersaturated.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information or belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed at Ludwigshafen, Germany, this 7th day of July, 2009.

A handwritten signature in black ink, appearing to read "Marco Kley".

Signature of Declarant